Digital Video Recorder

ELEX 290

Camosun College
Digital Video Recorder
USER MANUAL

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Table of Contents

1.0 Overview 1
2.0 Installation 1
2.1 Minimum Hardware Requirements 1
2.2 Software Requirements 1
2.3.0 Installation 2
2.3.1 Compiling the Kernel 3
2.3.2 Adding a Lilo Option for the New Kernel 5
2.3.3 Changing the Default Runlevel 6
2.4.0 Extras 6
2.4.1 Useful Commands 6
2.4.2 Speeding up the Boot Process 7
3.0 Operation 9
3.1 Main Menu 9
3.2 TV Guide Functions 10
3.3 Scheduling a Recording 10
3.4 Recording Schedule Functions 11
3.5 Audio Menu 12
3.6 Image Menu 12
3.7 Movie Menu 12
3.7.1 Recorded Movies 13
4.0 Line Switching 14
5.0 Keypad 15
6.0 LIRC Troubleshooting 15
7.0 Conclusion 17
8.0 Appendices 18
8.1 Remote functions 18
8.2 Bttv Cardlist 20
8.3 Lircd Config File 21
8.4 Lircd Config File Using irrecord –f Option 22
8.5 Lircrc Config File 23

1.0 Overview

Installing and operating the Digital Video Recorder (DVR) requires that you follow some important procedures.

This manual deals with the installation details for turning a PC into a DVR and describes the operation by remote control once the system is functional. The installation has been simplified to running a single install script which automates much of the install process.

2.0 Installation

2.1 Minimum Hardware Requirements

- 500 MHz Pentium II or equivalent
- 128 MB of RAM
- 100 MB of Hard Disk space
- 4x CD-ROM drive
- bttv video card with video capture capability (see appendix for card list)

2.2 Software Requirements

You must have Red Hat Linux 8.0 installed with the following packages:

- X Window System
  - XFree86-xdm
  - Authconfig-gtk
  - Firstboot
- KDE Desktop Environment
- Sound and Video
  - Xawtv
  - Xmms
- Development Tools
- X Software Development
- Network Servers
  - Rsh-server
  - telnet-server
- Kernel Development
  - Tk

2.3.0 Installation

The installation of Freevo and all of its software components can be quite tedious and lengthy explanation would be required if you were to install each package separately. To simplify the install process (and to save paper) the entire Freevo package can be downloaded from http://elex@www.elex.camosun.bc.ca/DVRSystems/freevo.tgz. This site is only open to Camosun College students and Faculty since there is a password required.

- Make sure you are running Linux and download the package to your root directory (you will have to be logged in as root to do this).
- Unzip the package by typing `tar xvzf freevo.tgz`.
- Begin installation by typing `./freevo_install`.

The install process can take anywhere from 20 minutes to over an hour depending on the speed of your computer. The process is as follows:

- You will be prompted to recompile the Linux kernel.

  This is a required step since video4linux is not enable by default in the kernel and will have to be enabled. Also, the serial port driver will have to be installed as a module since it could conflict with LIRC (Linux Infrared Controller), see section 2.3.1 'Compiling the Kernel' for instructions on how to do this**.** The install script has automated much of this process but it may still be useful to know the details in case you need to do it again.

- lilo.conf will be updated to include the new kernel
- Freevo will be configured and installed.
- XMLTV (the program that updates the channel listings) will be installed and configured.

> Note: After choosing which channels to include in the listings you will have to make sure that you update the TV_CHANNELS in the local_conf.py file in /usr/local/freevo to reflect the channel list in /root/.xmltv/tvgrabna.

- MPlayer and MP3Lame will be installed.
- Runlevel 4 will be configured to boot directly into Freevo.
- LIRC will be installed

You will see a configuration screen like the one shown below. If you have a homebrew IR module then all you will have to do here is select 'Save configuration & run configure.'

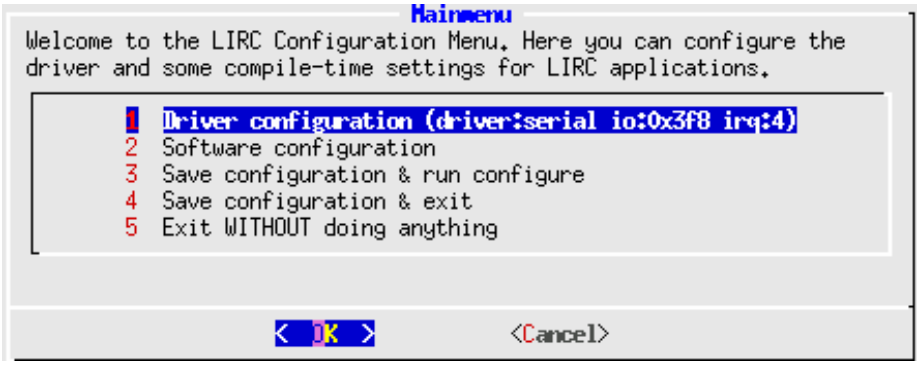

Mainmenu
Welcome to the LIRC Configuration Menu. Here you can configure the driver and some compile-time settings for LIRC applications.
1 Driver configuration (driver:serial io:0x3f8 irq:4)
2 Software configuration
3 Save configuration & run configure
4 Save configuration & exit
5 Exit WITHOUT doing anything
< OK >
<Cancel>

Figure 1: LIRC configuration menu.

When the installation is finished you will need to change the default runlevel to runlevel 4, see section 2.3.3 for instructions on how to do this.

2.3.1 Compiling the Kernel

Recompiling the kernel can be a good idea since there are a lot of programs are loaded into it that are rarely or never used and can slow performance. Also some programs need to look at the Makefile for the compiled kernel to determine the configuration of your system. The LIRC module is one example.

If you are running the Freevo install script then all you will have to do is click on 'Load Configuration from File' when the 'xconfig' menu comes up (Figure 1) and type `config-2.4.18-14`. This loads the configuration needed to run Freevo. You might want to make sure that you have the correct drivers installed for your hardware. Pay particular attention to the 'Processor Type and Features' menu shown in Figure 2 and make sure that it matches your hardware. When you are satisfied click 'Save and Exit' and the installer will take care of the rest.

If you are not running the Freevo installer and want to recompile the kernel then here are the steps that you should follow:

- Change the directory containing the source code from the current kernel.
- Type 'make mrproper' to clean up any previous attempt at building the kernel
- Type 'make xconfig' to bring up a menu with all of the kernel options (see figure 1) and select the options that you want to include in the new kernel. When you are finished click 'Save and Exit.'

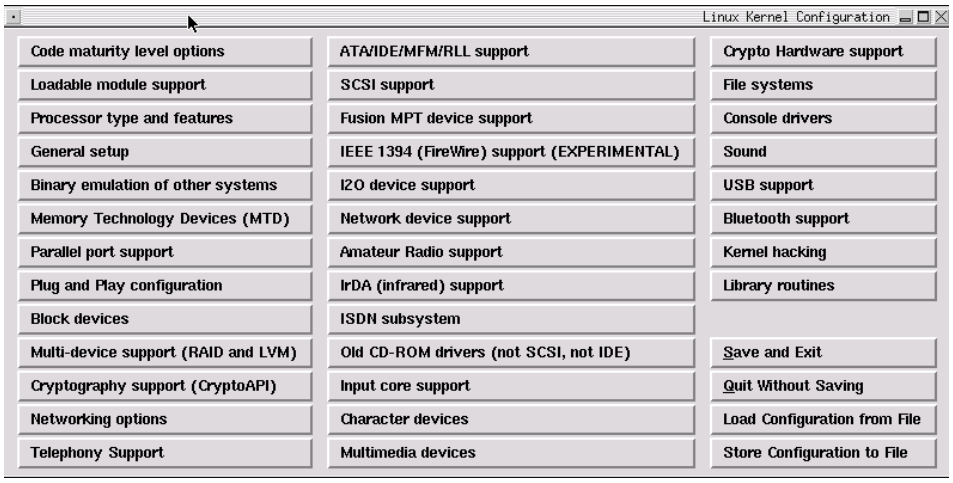


Figure 2: The xconfig menu.

Beside each option in the submenus there are three radio buttons labeled y,m and n (see Figure 2). Select y to install the option, n not to install the option and m to install the option as module. This means it is only added into the kernel when needed. If you don't know what an option is for you can click on the 'Help' button to the right.

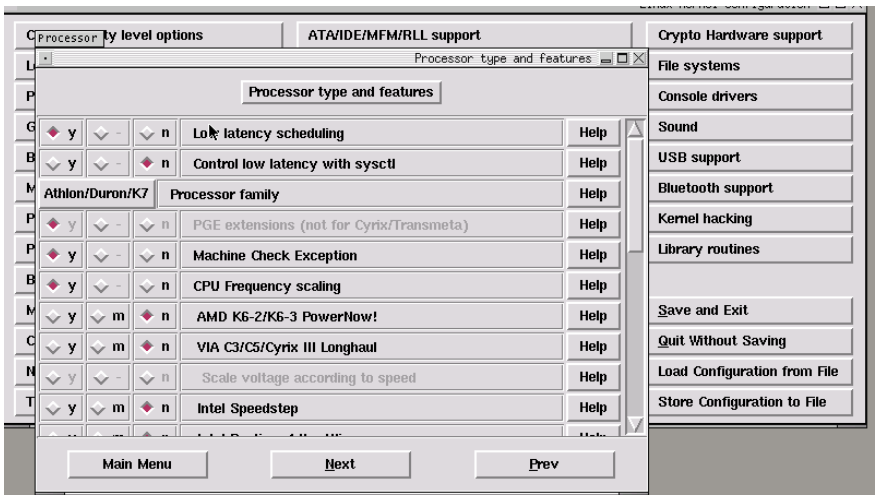


Figure 3: An xconfig submenu.

- Type 'make dep' to build the dependencies.
- Type 'make clean; make bzImage; make modules' to compile the kernel.
- Copy the System.map file from the linux source directory to /boot.
- Copy the bzImage file from the arch/i386/boot directory to /boot and rename vmlinuz-<version> where <version> is the version number of the kernel.

Caution: Make sure you name it something different than the one that is already there in case you need to boot into the old kernel.

- Change back to the kernel source directory and type ‘make modules_install’ to install the kernel modules.
- Type ‘make install’ to install the kernel.

> Hint: To see if the kernel installed properly you can look in the /boot directory. If there is a file called initrd-<version>.img, where <version> is the same name you gave to the bzImage file then the installation was successful.

Once the new kernel is compiled you will have to add an entry in the /etc/lilo.conf file so that you can boot into it. See section 2.3.2 ‘Adding a Lilo Option for the New Kernel’ for instructions on how to do this.

2.3.2 Adding a Lilo Option for the New Kernel

- Open the lilo.conf file from /etc.
- Copy and paste the boot options for the current kernel and change them to fit the new one (see example below).

```
prompt
timeout=50
default=linux-custom
boot=/dev/hda
map=/boot/map
install=/boot/boot.b
message=/boot/message
compact

image=/boot/vmlinuz-2.4.18-14
  label=linux
  initrd=/boot/initrd-2.4.18-14.img
  read-only
  append="root=LABEL=/"

image=/boot/vmlinuz-2.4.18-14custom
  label=linux-custom
  initrd=/boot/initrd-2.4.18-14custom.img
  read-only
  append="root=LABEL=/"
```

- Type ‘lilo’ to install the new lilo configuration.
- Type ‘lilo –v’ to write the new configuration to the boot sector.

2.3.3 Changing the Default Runlevel

To change the runlevel your system boot into, open the inittab file found in /etc. There should be a line that looks like this:

```
Id:5:initdefault:
```

Manually change the number in the second column the number of the runlevel you wish to boot into.

> Caution: Do not change the runlevel to 0 or 6 as this will make the system unbootable.

If you make a mistake here you can switch to another runlevel to fix it when the system boot by type CTRL-X at the LILO prompt, followed by the kernel name and the runlevel you wish to boot with. For example: If I had a kernel called Linuxcustom and I wanted to boot into runlevel 3 I would type 'linuxcustom init 3'.

2.4.0 Extras

2.4.1 Useful Commands

Here is a list of commands that should help you install freevo and or if you need to do some troubleshooting.

ls – displays the contents of a directory.
man – display a help file on how to use a particular command (example: man ls will bring up a help file on the 'ls' command.
locate – finds a particular file or folder.
top – displays a list of currently running processes. To kill a process type 'kill' followed by the process identification number (PID) of the process you wish to kill.
tar – a command for archiving and extracting files. To extract a .tar.gz or a .tgz file use the command 'tar xvzf' followed by the filename.
lsmod – displays a list of currently installed kernel modules.
modprobe – installs a kernel modules along with its dependencies.
rmmod – removes a currently installed kernel module.
ln – creates a link to a file (similar to a shortcut). To create a symbolic link to a file type 'ln –s' followed by the destination filename and the name you wish to give to the link.

2.4.2 Speeding up the Boot Process

If you ever get tired of waiting for your computer to boot then here is how you can speed it up by getting rid of the unnecessary time wasters.

First it might help to give a quick explanation of the boot process:

- When the system boots it looks for the init script, first in /etc and then in /sbin.
- init runs /etc/rc.d/rc.sysinit.
- rc.sysinit does a bunch of necessary things and then runs rc.serial (if it exists).
- init runs all the scripts for the default runlevel.
- init runs rc.local

There are 7 runlevels, 5 of which you can use as default:

- 0 – Halt (do not use as default)
- 1 – Single user mode
- 2 – Multiuser
- 3 – Full multiuser
- 4 – Unused
- 5 – X11
- 6 – reboot (do not use as default)

For each of these runlevels there is a folder containing a list of symbolic links. Each symbolic link points to a script in /etc/rc.d/init.d. These folders are found in /etc/rc.d.

Here are the contents of the folder for runlevel 4.

```
K05saslauthd  S09isdn     S14nfslock   S55sshd    S91Lirc     S99xfreevo
K20nfs        S10network  S17keytable  S56xinetd  S95anacron
K74ntpd       S13portmap  S28autofs    S90crond   S98local
```

The scripts the scripts that start with a K are sent a ‘stop’ command and the scripts that start with an S are sent a ‘start’ command. The numbers determine the order in which the scripts are run.

This is where you can speed things up by carefully removing the scripts that you don’t need.

> Note: Removing a symbolic link does not remove the original script. If you end up deleting something that you shouldn’t have you get copy the link from the folder for another runlevel or you recreate it.

Before removing a link you should read the script that the link points to and determine if it is necessary to load the script. You can list the links with there pointers by typing 'ls-l'. You can usually remove at least half of these.

3.0 Operation

3.1 Main Menu

Freevo's Main Menu gives you the option to enter the TV, Movie, Music and Images submenus by highlighting the submenu and pressing the *SELECT (OK)* button on either the IR remote or the keypad. The Main Menu also allows the DVR unit to be shutdown directly.

- Press SELECT to enter the submenu that is currently highlighted.
- Press EXIT to return to the last submenu you had previously visited.

Figure 4: Freevo Main Menu

3.2 TV Guide Functions

The TV menu displays the current shows on TV and displays a brief description of each program (Figure 5).

- Press the *INFO* button on the IR remote to turn off the description.

This provides just a listing of the channels and allows the system to display more channels simultaneously (Figure 6).

- Press the *PGUP* and *PGDN* on the remote allow a user to scroll through the TV listings by pages and quickly browse the guide for their desired shows.

TV GUIDE - 03/18 10:57
Mr. Dressup
CBC
03/18 10:30 11:00 11:30 12:00
CBC Mr. Dressup Fran... T... Rolie... Zoboomafoo CBC News: Tod..
SRC Tous les matins Ricardo L'Heure du midi
KNOWLEDGE Dre... E... Kitty C... The Staff Room Venturing Forth Mark and Image
TSN UEFA Champions League Weekly Soccer
CHEK(CH) The Price is Ri... The Young and the Restless CH News at N..
KCTS Sesame Street Barney & Friends Mister Rogers' ... Clifford the Big ...
CHAN World Vision Crossing Over ... MoneyWise Noon News H..
CIVT The View Balance: Televis... Daily Planet eTalk DAILY
LOCAL Local Program... Local Programming
CIVI Greco Health an... Pacific Blue All My Children

Figure 5: TV Guide Menu

TV GUIDE - 03/18 11:50
03/18 11:30 12:00 12:30 13:00
CBC Zoboomafoo CBC News: Tod.. The New Red G... This Hour Has 2..
SRC L'Heure du midi Wizz L'Agent fait l'id..
KNOWLEDGE Venturing Forth Mark and Image Reach for the T..
TSN Soccer
CHEK(CH) The Young an... CH News at Noon Body & Health
KCTS Mister Rogers' ... Clifford the Big ... Reading Rainbow Teletubbies
CHAN MoneyWise Noon News Hour As the World ...
CIVT Daily Planet eTalk DAILY The Bold and th... Vicki Gabereau
LOCAL Local Programming
CIVI Pacific Blue All My Children One Life to Live
CKVU CityLine CityCooks StarTV In Advance of ...
KSTW Judge Joe Brown The People's Court Divorce Court
KCPQ Jenny Jones Maury Beyond With Ja..
KOMO Port Charles All My Children One Life to Live

Figure 6: TV Guide Menu with display off

3.3 Scheduling a Recording

- Highlight the show you wish to record and press *RECORD* button on the IR remote to enter the TV recording submenu (Figure 7).

The recording name will default to the shows name as well as the start time and date. The quality may be selected to be low, medium or high quality. The start time may be selected from 00:00h to 24:00h in 10 min increments. The recording length may also be selected in 10 min increments.

- Highlight Schedule recording and press *SELECT (OK)* on the IR remote to schedule the recording.

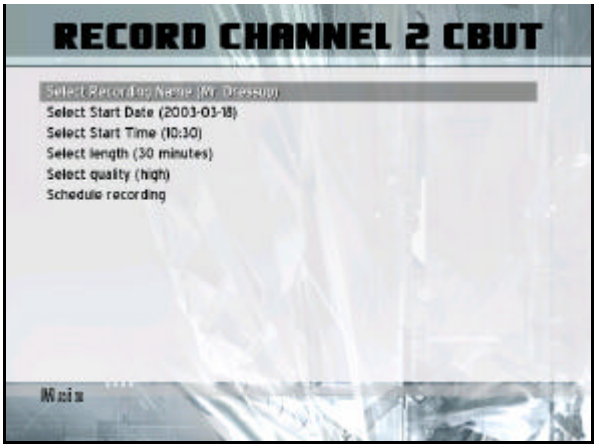


Figure 7: TV Schedule Record Menu

Hint: Use the *PGUP* and *PGDN* to quickly scroll through pages that contain more than one page of information (i.e. TV listings, start time, recording length time etc).

3.4 Recording Schedule Functions

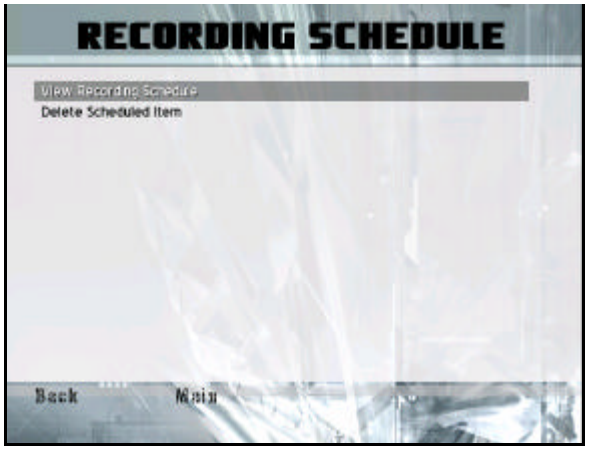


Figure 8: Recording Schedule Menu

- Press *INFO* on the IR remote while in the TV schedule recording menu (Figure 7) to display the recording schedule (Figure 8).

The View Recording Schedule menu (Figure 9) will display a current list of schedule recordings and any recordings currently being executed. The Delete Scheduled Item menu (Figure 10) will show you the same files as the Record Schedule menu but allows you to remove any scheduled recordings or even stop a current recording that is taking place.

Figure 9: View Recording Schedule Menu

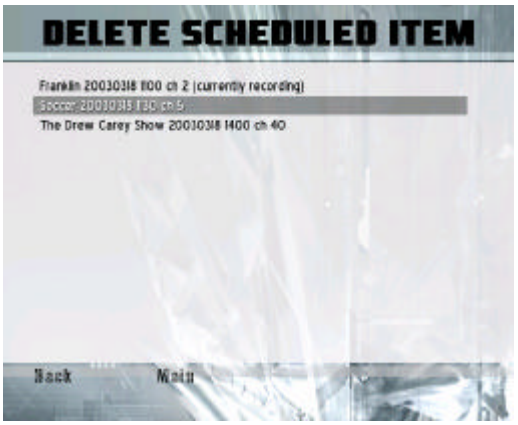

DELETE SCHEDULED ITEM
Franklin 20030318 1100 ch 2 (currently recording)
The Drew Carey Show 20030318 1400 ch 40
Back
Main

Figure 10: Delete Scheduled Item Menu

Figure 11: Audio Main Menu

3.5 Audio Menu

The Audio main menu allows direct access to any CD or DVD-ROM's that are used in the system (Figure 10). The system detects whether the disc in the drive is a video CD (VCD), a super video compact disc (SVCD) or digital video disc (DVD).

- Highlight the disc identifier (SVCD) and press *SELECT (OK)* to play the movie or audio disc.

The audio files (wav, mp3 etc.) are contained within the Audio folder inside the Audio main menu.

3.6 Image Menu

The Images main menu contains folders for your digital pictures (Images) and slide shows (Slide Show) that you have created from your digital still pictures. The CD/DVDrom may also be accessed from the Image main menu (Figure 12).

Figure 12: Images Main Menu

Figure 13: Movie Main Menu

3.7 Movie Menu

The Movie main menu allows you to access the CD/DVD-ROM and to enter the Movies folder which contains all the movies and recorded videos on the hard drive (Figure 13).

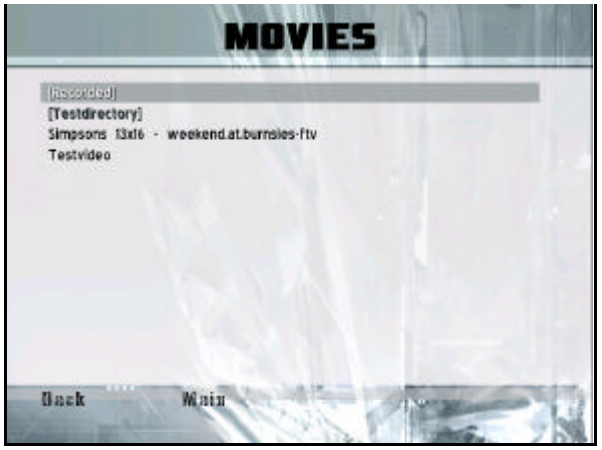


Figure 14: Movies Folder

The Movies folder contains a Recorded subfolder and any movies that are on the hard drive (Figure 14).

3.7.1 Recorded Movies

The Recorded subfolder contains all the TV shows that have been previously recorded. The files are displayed in the following format: TV show name, year, month, day, start time and channel (Figure 15).

It is possible to delete movie and audio files stored on Freevo from within the user interface.

RECORDED
American Soundtrack Rhythm Love And Soul 20030314 0930 Ch 24
Caserne 24 20030314 1700 Ch 3
Des Mots Et Des Maux 20030315 1800 Ch 3
Franklin 20030318 1100 Ch 2
Hockey 20030315 1300 Ch 3
La Fureur 20030314 2000 Ch 3
Living With Michael Jackson 20030314 1500 Ch 70
The Simpsons 20030314 1700 Ch 2
Sesame Street 20030314 1000 Ch 7
Star Trek Voyager 20030314 1600 Ch 12
Back
Main

Figure 15: Recorded Folder

Figure 16: File Delete Confirmation

Highlight the file then press *C* on the remote to delete the file. A message will prompt the user to press *C* on the remote to confirm, or *B* to cancel. This allows the user to control the media content on his DVR (Figure 16).

4.0 Line Switching

The DVR allows recording and playback from 4 composite line inputs located on the back panel of the DVR. These inputs are switched by the remote control TV_VCR button.

NOTE: The remote must be in TV mode to switch inputs.

Figure 17: DVR multiple line inputs

Freevo selects the input video source when any TV channel is selected from within the TV guide menu. The DVR will either choose to capture from the coaxial cable input if 'Cable' is displayed on the Vacuum Fluorescent Display (VFD) or from composite inputs if Line1, Line2, Line3 or Line4 (Figure 17) is displayed on the VFD before any TV channel is selected for viewing.

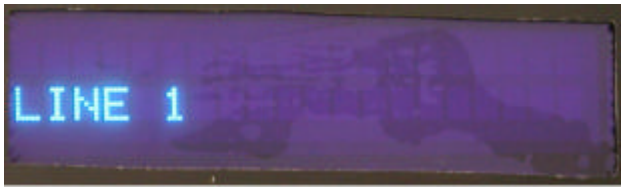
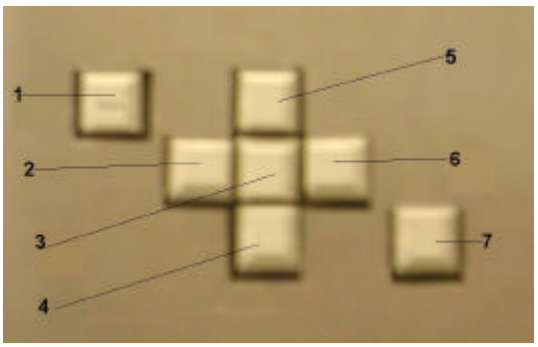


Figure 18: VFD line input display

5.0 Keypad



1. POWER
2. LEFT
3. SELECT (OK)
4. DOWN
5. UP
6. RIGHT
7. EXIT

Figure 19: Keypad Layout

- Hold EXIT and POWER simultaneously to perform a hard shutdown (cutting power) if the system freezes and a normal POWER button key press does not turn off the system.

The keypad on the front display of the DVR contains all of the necessary buttons to control Freevo.

6.0 LIRC Troubleshooting

LIRC (Linux Infrared Remote Control) was previously installed by the script ran earlier.

First we must ensure that your IR detector is working correctly. We must stop the LIRC daemon (server) to test this.

- Type '`/etc/rc.d/init.d/lirc.redhat stop`'

This will stop the daemon.

- Type '`mode2`'
- Press a button on the remote.

You should see a series of pulses and spaces like the ones shown below if your IR detector is operating correctly.

```
pulse 93
space 4965
pulse 108
space 4969
pulse 93
space 7496
pulse 93
space 7489
pulse 93
```

If you do not see any pulses or spaces you may need to ensure that it is receiving valid serial data and is passing it through to the DCD (Data Carrier Detect) pin on com1 of the serial port.

When the IR detector is operating correctly, you may move on to the next part of the configuration.

- Check http://lirc.sourceforge.net/remotes for your remote control.
- Download the appropriate config file for your remote to the /etc directory.

If your remote control does not seem to be supported, you may generate your own config file for your remote using the irrecord program.

- Switch to the /etc directory.
- Type '`irrecord <your_remote_name_here>` '

The irrecord program will prompt you to press the buttons repeatedly to try and figure out the gap length. The program identifies the protocol that the remote is using and finishes recording the keys and saves it to the remote name you gave it previously. (Appendix 8.3)

- Use the 'irrecord –f' option if something goes wrong to force the program to record each individual pulse or space (1 or 0) in the IR stream for each button pressed.

When using the –f option you will need to manually map each key you wish to use on your remote control. (Appendix 8.4)

- Rename your config file generated to lircd.conf.

When you have a valid config file in the /etc directory, you can rename it to lircd.conf.

- Select 'yes' to overwrite the old lircd.conf file

We must now test to ensure the lircd daemon (server) is able to distinguish valid key presses from your remote control.

- Type `/etc/rc.d/init.d/lirc.redhat start` to start the lircd daemon
- Type 'irw'

You should see valid key presses for your remote.

```
0000000000f40bf0   00 1_DOWN your_remote_name_here
0000000000f40bf0   01 1_DOWN your_remote_name_here
0000000000f40bf0   02 1_DOWN your_remote_name_here
0000000000f40bf0   03 1_DOWN your_remote_name_here
0000000000f40bf0   04 1_DOWN your_remote_name_here
0000000000f40bf0   05 1_DOWN your_remote_name_here
0000000000748bf0   00 1_UP     your_remote_name_here
0000000000748bf0   01 1_UP     your_remote_name_here
0000000000748bf0   02 1_UP     your_remote_name_here
```

The first column displays the IR serial command. The second column displays the number of times the pulse was repeated. The third column displays the button that was pressed and the forth column shows the name of the remote that was decoded.

When you receive valid key presses like the ones displayed above, you may proceed onto the next section of configuring.

Next you need to create a "lircrc" config file in the /etc/freevo directory to allow the lircd daemon to communicate with Freevo. Follow the example in Appendix 8.3 for each button you wish to map in Freevo.

> NOTE: ensure all commands are in upper-case as Freevo is case sensitive.

The LIRC infrared remote control setup has now been completed.

7.0 Conclusion

Thank you for choosing DVR Systems Inc. You are using the easiest most user configurable DVR player on the market. In case of problems don't hesitate to call us at 1-800-DVR-2003.

8.0 Appendices

8.1 Remote functions

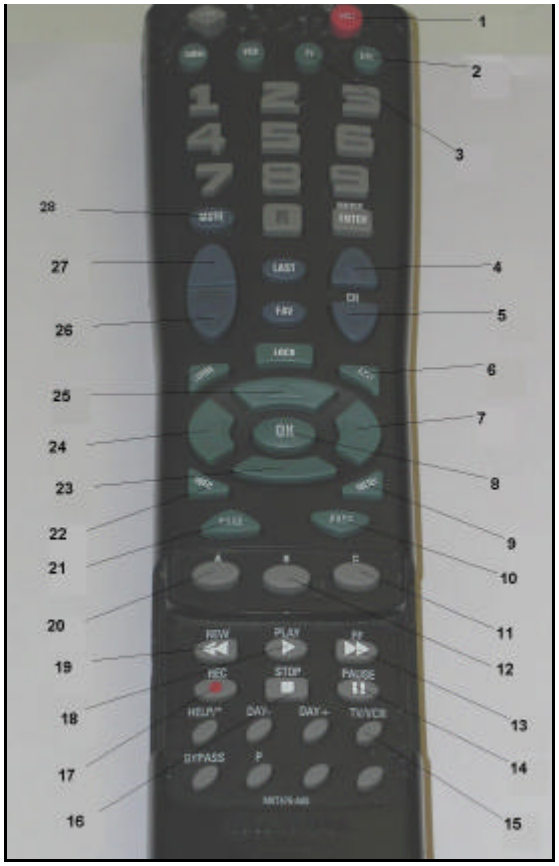


Figure 2 Shaw IR Remote Control

1. **POWER**
   Turns the DVR power on or off (**Must** be in TV mode)

2. **CABLE**
   Selects CABLE mode to control **all** Freevo options

3. **TV**
   Selects TV mode to turn on the DVR (POWER) or to switch line inputs (TV_VCR)

4. **CHANNEL UP**
   Increments to the next channel while watching TV

5. **CHANNEL DOWN**
   Decrements to the next channel while watching TV

6. **EXIT**
   Exits the current menu and reloads the previous menu

7. **RIGHT**
   Moves the cursor position to the right in Freevo
   Fast forwards 60s while viewing a movie file

8. **SELECT (OK)**
   Selects the current highlighted item (enter a menu, play a file or confirm a response)

9. **MENU**
   Loads the main menu

10. **PGDN**
    Scrolls down one page to the next page of information (TV guide etc)

11. **C**
    Deletes a currently highlighted file

12. **B**
    Cancels a file deletion when prompted

13. **FF**
    Fast forwards 10s

14. **PAUSE**
    Pauses the current playing video

15. **TV_VCR**
    Switches the line inputs to the DVR (**Must** be in TV mode)

16. **STOP**
    Stops a video currently playing (EXIT also stops currently playing file)

17. **REC**
    Opens the Schedule Recording Menu, to configure the recording, when a TV show is highlighted in the TV guide

18. **PLAY**
    Plays the highlighted file

19. **REW**
    Rewinds 10s

20. **A**
    Ejects the CD/DVDrom

21. **PGUP**
    Scrolls up one page to the next page of information (TV guide etc)

22. **INFO**
    Turns show description on or off while in the TV guide menu
    Enters the View Recording Schedule menu when pressed in the TV Schedule Recording menu

23. **DOWN**
    Moves the cursor position down in Freevo
    Rewinds 600s while viewing a movie file

24. **LEFT**
    Moves the cursor position to the left in Freevo
    Rewinds 60s while viewing a movie file

25. **UP**
    Moves the cursor position up in Freevo
    Fast forwards 60os while viewing a movie file

26. **VOL+**
    Turns the volume down in Freevo

27. **VOL-**
    Turns the volume up in Freevo

28. **MUTE**
    Mutes the volume in Freevo

8.2 Bttv Cardlist

```
MIRO PCTV
Hauppauge (bt848)
STB
Intel
Diamond DTV2000
AVerMedia TVPhone
MATRIX-Vision MV-Delta
FlyVideo II (Bt848) LR26
IXMicro TurboTV
Hauppauge (bt878)
MIRO PCTV pro
ADS Technologies Channel Surfer TV
AVerMedia TVCapture 98
Aimslab Video Highway Xtreme (VHX)
Zoltrix TV-Max
Pixelview PlayTV (bt878)
Leadtek WinView 601
AVEC Intercapture
LifeView FlyKit w/o Tuner
CEI Raffles Card
Lucky Star Image World ConferenceTV
Phoebe Tv Master + FM (CPH050)
Modular Technology MM205 PCTV, bt878
[many vendors] CPH05X/06X (bt878)
Terratec/Vobis TV-Boostar
Newer Hauppauge WinCam (bt878)
MAXI TV Video PCI2
Terratec TerraTV+
Imagenation PXC200
FlyVideo 98
iProTV
Intel Create and Share PCI
Terratec TerraTValue
Leadtek WinFast 2000
Flyvideo 98 (LR50Q) / Chronos Video Shuttle II
Flyvideo 98FM (LR50Q) / Typhoon TView TV/FM
    Tuner
PixelView PlayTV pro
TView99 CPH06X
Pinnacle PCTV Studio/Rave
STB2
AVerMedia TVPhone 98
ProVideo PV951
Little OnAir TV
Sigma TVII-FM
MATRIX-Vision MV-Delta 2
Zoltrix Genie TV/FM
Terratec TV/Radio+
Dynalink Magic TView
GV-BCTV3
Prolink PV-BT878P+4E / PixelView PlayTV PAK /
       Lenco MXTV-9578 CP
Eagle Wireless Capricorn2 (bt878A)
Pinnacle PCTV Studio Pro
Typhoon TView RDS + FM Stereo / KNC1 TV
        Station RDS
Lifetec LT 9415 TV (LR90 Rev.F)
BESTBUY Easy TV (CPH031)
FlyVideo '98/FM
GrandTec 'Grand Video Capture' (Bt848)
Phoebe TV Master Only (No FM) CPH060
TV Capturer (CPH03X)
Modular Technology MM100PCTV
AG Electronics GMV1
BESTBUY Easy TV (bt878)
ATI TV-Wonder
ATI TV-Wonder VE
FlyVideo 2000S
Terratec TValueRadio
GV-BCTV4/PCI
3Dfx VoodooTV FM (Euro), VoodooTV 200 (USA)
Active Imaging AIMMS
PV-BT878P+
Flyvideo 98EZ (capture only)
Prolink PV-BT878P+9B
       (PlayTV Pro rev.9B FM+NICAM)
Sensoray 311
RemoteVision MX (RV605)
Powercolor MTV878/ MTV878R/ MTV878F
Canopus WinDVR PCI (COMPAQ Presario 3524JP,
     5112JP)
GrandTec Multi Capture Card (Bt878)
AOPEN VA1000
```

8.3 Lircd Config File

```
# this config file was automatically generated
# using lirc-0.5.5 on Wed Jun  5 07:33:26 2002
#
# contributed by
#
# brand:            General Instrument/Motorola
# model:            ?
# supported devices: dct2000 settop box

begin remote

  name  gi-motorola-dct2000
  bits          16
  flags SPACE_ENC|CONST_LENGTH
  eps           30
  aeps          100

  header       9036  4424
  one           556  2185
  zero          556  4424
  ptrail        556
  gap         100025
  repeat_bit    0

    begin codes
        HELP                    0x0000000000000B3F2
        POWER                   0x000000000000AFF9
        MUTE                    0x00000000000000FF7
        EXIT                    0x0000000000000B7F4
        PGUP                    0x000000000000A3F3
        LOCK                    0x00000000000097F6
        PGDN                    0x000000000000023FB
        INFO                    0x000000000000033FA
        UP                      0x000000000000D3F6
        DOWN                    0x000000000000053FE
        LEFT                    0x000000000000093F1
        RIGHT                   0x000000000000013F9
        OK                      0x000000000000077F8
        GUIDE                   0x0000000000000F3F4
        MENU                    0x000000000000067F9
        VOLUP                   0x00000000000004FF3
        VOLDN                   0x00000000000008FFB
        LAST                    0x000000000000037FC
        CHUP                    0x00000000000002FF5
        CHDN                    0x0000000000000CFFD
        A                       0x000000000000017FE
        B                       0x00000000000001BF1
        C                       0x0000000000000EBF9
        ENTER                   0x0000000000000F7F0
        STOP                    0x000000000000063FD
        PAUSE                   0x000000000000007FF
        PLAY                    0x00000 0000000E3F5
        REW                     0x000000000000087F7
        REC                     0x000000000000073FC
        FWD                     0x000000000000047FB
    end codes

  end remote
```

8.4 Lircd Config File Using irrecord -f Option

```
# Please make this file available to others
# by sending it to <lirc@bartelmus.de>
#
# this config file was automatically generated
# using lirc-0.6.6(serial) on Tue Mar  4 15:27:12 2003
#
# contributed by
#
# brand:                       keypad
# model no. of remote control:
# devices being controlled by this remote:

begin remote

  name   keypad
  flags CONST_LENGTH|RAW_CODES
  eps            30
  aeps          100

  ptrail         0
  repeat    0    0
  gap    66561

      begin raw_codes

          name UP
             830     832    2497    1663    1665     832
             832     831    2497    1663    1666     831
             832     831    2497    1664    1665

          name DOWN
            1664     832    1663    1665    1663     832
            1665     832    1663    1665    1664     831
            1666     831    1663    1666    1663

          name LEFT
            2496     831     832    1665    1664     831
            2497     832     831    1666    1663     832
            2497     831     831    1666    1663

          name RIGHT
             833    1663    1663    1665    1663     832
             834    1663    1663    1665    1663     832
             834    1663    1663    1666    1663

          name SELECT
            4159    1663    1665     832    4160    1663
            1666     831    4160    1663    1666

          name EXIT
             830     832     831     832     834    1663
            1663     836     833     828     831     832
             834    1663    1663     834     832     831
             832     831     834    1663    1663

      end raw_codes

    end remote
```

8.5 Lircrc Config File

#GI-MOTOROLA-DCT2000" CONFIG KEYS FROM LIRCD.CONF

```
begin
        prog    = freevo
        remote  = gi-motorola-dct2000
        button  = HELP
        repeat  = 0
        config  = HELP
end

begin
        prog    = freevo
        remote  = mute
        button  = MUTE
        repeat  = 0
        config  = MUTE
end

begin
        prog    = freevo
        remote  = gi-motorola-dct2000
        button  = EXIT
        repeat  = 0
        config  = EXIT
end

begin
        prog    = freevo
        remote  = gi-motorola-dct2000
        button  = PGUP
        repeat  = 0
        config  = CH+
end

begin
        prog    = freevo
        remote  = gi-motorola-dct2000
        button  = LOCK
        repeat  = 0
        config  = LOCK
end

begin
        prog    = freevo
        remote  = gi-motorola-dct2000
        button  = PGDN
        repeat  = 0
        config  = CH-
end

begin
        prog    = freevo
        remote  = gi-motorola-dct2000
        button  = INFO
        repeat  = 0
        config  = DISPLAY
end

begin
        prog    = freevo
        remote  = gi-motorola-dct2000
        button  = UP
        repeat  = 0
        config  = UP
end
```